



## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 8

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DATE: August 3, 2000

Ref: 8EPR-PS

MEMORANDUM

SUBJECT: Review Comments for the Libby Emergency Response - Removal Action Sampling and Analysis Plan

FROM: Mary Goldade, Chemist

TO: Paul Peronard, On-Scene Coordinator; 8EPR-ER  
Duc Nguyen, On-Scene Coordinator; 8EPR-ER

At your request, I have performed a review of the of the *Removal Action Sampling and Analysis Plan for Confirmation Sampling of Soil and Perimeter and Personal Sampling of Air for Asbestos, Operable Unit 02* (July 2000). This Sampling and Analysis Plan (SAP) was submitted by the U.S. Department of Transportation - Volpe Center for EPA review.

The SAP was reviewed for minimum components prescribed in the *Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures, Interim Final* (USEPA 1990). Five major areas were evaluated during the review. These are summarized below. A list of specific review questions considered during the evaluation is provided as an appendix to the review comments.

1. Data Quality Objectives (DQOs)
2. Sample Media, Location and Number
3. Field Screening and Sampling
4. Laboratory Analysis
5. Quality Assurance/Quality Control (QA/QC)

Review comments are attached. Comments pertaining to the overall design of the document are summarized under the General Comments section. Comments regarding the detail of the SAP are provided in the Specific Comments section. Please note that EPA does not assume responsibility for implementation of the site-wide activities and expects that the contractors implementing the SAP will take steps to ensure that all work is performed safely and in accord with the approved SAP.

Attachment (1)

cc: C. Weis, 8EPR-PS



## GENERAL COMMENTS

Overall, the SAP appears to provide an adequate basis for soil sampling and air monitoring programs planned during removal activities at Operable Unit 02 (OU2) [Screening Plant]. Appropriately, the SAP has been written in general terms to be flexible enough to support unforeseen activities that may be required as the investigation unfolds. However, there are several components of the plan that should be improved or added to fully support the removal activities. These are outlined below.

1. Database Use and Population. As written, the SAP does not provide adequate direction about database use and population. The removal activities will generate a large volume of data that must be maintained in the database in a timely manner. Although it is not necessary for the SAP to include the specific details how the Libby Site Field Database is used, the SAP must include guidelines for when and at which steps in the sampling and analysis activities the database will be populated. A flow diagram such as the attached example (Appendix B) incorporates the data entry activities into the sample and analysis process. Additionally, the SAP should reference the Draft Field Database User's Manual (July 2000) and include a statement emphasizing that timely data will occur according to project requirements outlined in flow diagrams, tables, or another appropriate means of identifying data entry deadlines.
2. Data Quality Objective: Number of Sample Locations. The SAP should provide the rationale applied in assigning the number of sampling locations for perimeter air monitoring samples. Likewise the justification for selection of the 100 ft<sup>2</sup> grid for soil sampling should also be provided.
3. Environmental and Human Health Action Limits and Trigger Limits. As written, the SAP identifies preliminary action limits for soil and air samples as 1% asbestos and 0.1 asbestos fibers per cubic centimeter (cc), respectively. The text further states that ultimately EPA will define the limits that will be used to ensure that onsite soils are deemed clean, off-site land remains unimpacted from cleanup activities, and workers are protected during cleanup activities. Firm action limits for both air monitoring and soil sampling should be clearly presented in the SAP prior to implementation. Additionally, a warning or trigger level should be established for each type of air sample. The trigger level will serve as an indicator that additional controls (e.g., increased dust suppression) may be required to maintain asbestos levels below the action limit. These steps are key to ensuring that when removal activities commence, they run smoothly without delay or confusion. An example of limits for personal air monitoring and soil samples that might be used is provided below. However, final limits and levels should be discussed with and will be approved by the EPA site toxicologist and On-Scene Coordinator prior to implementation.

Air Sample Description	Trigger Level	Action Level
Personal Air	0.01 fibers/cc	0.1 fibers/cc

4. QA/QC Program. Many of QA/QC components that are required in a SAP are provided in the document. However, several important issues should be addressed. These are:
- A. Discuss whether and how Assessment and Oversight Activities (audits) will be performed during these sampling and analysis activities;
  - B. Discuss the details of sample archiving. Include information such as what samples will be archived, where they will be archived, the length of time they will be archived and when the samples will be archived after sampling;
  - C. Indicate whether any raw or prepared samples will be transported to a second laboratory for analytical verification (analysis by the same method as was performed by the primary laboratory);
  - D. Identify training and certification requirements for all field activities;
  - E. List the documentation that must be completed and retained by the analytical laboratory and/or the field workers;
  - F. List the documentation that will be provided by the analytical laboratory or field workers to EPA as part of the hardcopy data deliverable;
  - G. List the electronic files required for that will be provided to EPA and/or the Database Manager (at ISSI Consulting Group) as part of the electronic data deliverable;
  - H. Identify what data verification and/or validation will be performed on the analytical results (Refer to the *Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures, Interim Final*) for further details;
  - I. Identify the final reporting requirements. Indicate what reports (electronic and hardcopy) will be provided for the laboratory results. Indicate whether a summary report will be provided by the prime contractor describing the activities at OU2. If other

If any of these components are contained in a separate and approved project document, it is only necessary to refer to the document in the SAP. For your convenience, several examples of text that is often used to address the QA/QC issues are provided in Appendix C. However, these should be used for example only and should be modified appropriately as applicable to the project-specific requirements.

## SPECIFIC COMMENTS

Site Background: Section 1.1, page 1-2, second paragraph. The SAP states that: "Fibers are microscopic and nearly indestructible." It is recommended that this sentence be re-worded to a phrase such as: "Fibers are microscopic and environmentally persistent."

Project Objectives: Section 1.2, page 1-2. The third of three primary objectives listed for the OU2 removal action is: "Leave the site in suitable condition for reuse with no land use restrictions". While this is an important goal, it may be several months before EPA has a full understanding of the appropriate analytical and risk assessment methods that will be sufficient for defining whether a soil is cleared for unrestricted, residential use. Additionally, the methods being used for the confirmation sampling (e.g., PLM) will not likely be adequately sensitive to achieve this goal. Softer language, that provides for an achievable is recommended. Alternative language may be: "Leave the site in suitable condition for reuse based upon the best and reasonably available analytical techniques."

Project Organization and Responsibilities: Section 1.3, page 1-3. Duc Nguyen, EPA Assistant On-Scene Coordinator should be included on the list of key management personnel. Also, the relationship and/or separation of responsibilities for air samples between the CDM Federal Field Team Leader and the PES Field Team Leader should be outlined to ensure that important duties are not duplicated or overlooked.

Site Background: Section 2.0, first paragraph, page 2-1. The SAP states that: "The W.R. Grace Company...and sold its properties four yours later." It may be appropriate to add an additional statement to provide a clear understanding of current property ownership status. It is recommended that the statement read as follows: "While the mine property has recently been reacquired by W.R. Grace (*insert year of acquisition*), the Former Screening Plant remains under ownership by another entity."

Site Background: Section 2.0, third paragraph, first sentence, page 2-1. The word "former" should be replaced with "formerly".

Previous Investigations: Section 2.2, third paragraph, page 2-2. The SAP states that several ambient air sampling events were performed at the Screening Plant, but does not provide information about the results. Please summarize the ambient air sampling results as was done for the soils.

Data Quality Objectives-Soil: Section 3.1, last paragraph, page 3-1. The problem statement should be re-worded for clarity. For example, the following may be more appropriate: "Soil sampling efforts conducted in late 1999 and early 2000 identified asbestos-contaminated soils at OU2 resulting from vermiculite ore processing activities. The contaminated soils will be removed during excavation activities at the site. However, information about the extent of the contamination may require refinement prior to excavation. Therefore, pre-excavation sampling

will be performed as necessary to better define the limit and extent of soil and waste removal. Additionally, the success of the excavation activities must be evaluated. Thus, confirmation sampling will be performed immediately following soil excavation to determine if the activities have successfully removed contaminated soil materials from OU2."

Boundaries of the Removal Action: Section 3.1.4, page 3-3. The SAP states that "...temporal boundaries include...to the time of this removal action in 2000." Stated temporal boundaries should include the time for the removal action to be completed (after the site is deemed by EPA to be clean). Placing the upper limit on the completed action rather than the removal action (in 2000) itself will account for any of the obstacles (provided in Section 3.1.4) that may be encountered during the removal activities.

Decision Rule: Section 3.1.5, third sentence, page 3-3. Replace the word "tremolite" with the phrase "the tremolite-actinolite solution series".

Limits on Decision Errors: Section 3.1.6, second paragraph, page 3-4. This section states that: "...a tolerable decision limit of  $\pm 100\%$  of the action level has been established." The soil action level is defined in Section 3.1.5 at 1% asbestos. Therefore, the using the suggested decision error, the tolerable range is 0-2% asbestos. Although the upper limit (2% asbestos) is reasonable, it is not feasible to achieve the lower end of this goal since the limit of quantitation by PLM is 1%. It is recommended that the lower decision limit value be clarified. For example, the text should state that lower limit may be qualitative. That is, additional removal action may be taken on any sample reported having "trace" levels of fibrous asbestos in the soil.

It is unclear what the sensitivity of the PLM method is to quantitatively report trace levels of asbestos in soil. Therefore, it is unclear to what extent, if any, a subsample at or above the action limit may be "diluted" by the remaining subsamples for a composite if they all are below the limit of quantitation. For example, if each subsample in the composite were measured individually and a quantitative result could be obtained for subsamples containing less than 1% asbestos, then the resulting composite measurement should be:

$$\text{Composite Sample} = \frac{S1 + S2 + S3 + S4 + S5}{5}$$

Where:

S1 - S5 = subsample measurements for samples 1 through 5 (% asbestos)

If the measurements for each subsample were as follows, then the resulting composite measurement will be:

$$\text{Composite Sample} = \frac{1\% + 0.5\% + 0.5\% + 0.5\% + 0.5\%}{5} = 0.6\%$$

Because the PLM method is a visual estimate of the asbestos content of the soil sample, the error associated with the quantitative result is greater than 1%. The SAP should identify this method limitation and indicate what procedures will be put in place to determine when additional soil removal is necessary if trace levels of fibrous asbestos are found in composite samples.

Optimize the Decision for Obtaining Data: Section 3.1.7, last sentence, page 3-4. Replace the words "and/or" with "and".

Identify the Decision: Section 3.2.2, Bullet #1, page 3-5. State that the background ambient air samples will be collected in the same location as subsequent investigative samples.

Identify the Decision: Section 3.2.2, Bullet #3, page 3-6. Consider altering the text from: "Has the performance of the emergency removal action reduced ambient airborne asbestos fiber levels within the regulated emergency removal action area?" to "Are the ambient airborne asbestos fiber levels at or below levels reported in the background samples prior to commencement of the removal action?"

Inputs to the Decision: Section 3.2.3, Regulatory Limits, page 3-7 and Decision Process: Section 3.2.5, page 3-8. As written, the SAP provides a list of potential exposure action levels (Table 1) and suggests a preliminary action limit for personal air monitoring samples at 0.1 fibers/cc. Firm action limits for both ambient and personal air monitoring activities should be clearly presented in the SAP. Additionally, a warning or trigger level should be established for each type of air sample. The trigger level will serve as an indicator that additional controls (e.g., increased dust suppression) may be required to maintain asbestos levels below the action limit. Final limits and levels will be established by the EPA site toxicologist and On-Scene Coordinator. However, recommended limits for personal air samples are provided below. See also General Comment #3.

Air Sample Description	Trigger Level (fibers/cc)	Action Level (fibers/cc)
Personal Air	0.01	0.1

While Table 1 is useful to compare the various recommended action limits, only limits pertaining to air media should be included in the list if the table is retained. Therefore the EPA (OW) Maximum Contaminant Level applies to water samples and should be removed from the table.

Inputs to the Decision: Section 3.2.3, page 3-6. This section should identify Global Positioning System (GPS) coordinates as an Input to the Decision. GPS readings will be taken at all perimeter air monitoring samples.

Decision Process: Section 3.2.5, Ambient Air Monitoring, page 3-8. Include text describing the procedures to take when the trigger level is exceeded. When discussing the procedures for when

the action level is exceeded, indicate whether off-site sampling will be required to determine if off-site contamination is occurring.

Decision Process: Section 3.2.5, Personal Air Monitoring, page 3-8. Include text describing the procedures to take when the trigger level is exceeded. When discussing the procedures for when the action level is exceeded, refer to the document that outlines the procedures workers must take if they are exposed to levels at or above 0.1 fibers/cc. If these procedures are not provided in another document, describe them here.

Specify Tolerable Limits on Decision Errors: Section 3.2.6, first complete paragraph, page 3-9. This section defines a "gray region" that is "...normally established which surrounds an action level.". It is recommended that the terms "limit on decision errors" or "decision error" be used instead.

This section recommends a limit on decision error of  $\pm 50\%$  be used. However, it is unclear upon which measurement the limit is being placed: the analytical measurement itself or on the action level. If it is presumed that the limit refers to the action level, the following observations are made. First, the upper limit for an air monitoring sample should not exceed the action limit. Therefore, a "+50%" decision limit does not apply. Second, the lower limit on decision errors may be appropriate at -50%, but should be approved by the EPA toxicologist and On-Scene Coordinator. However, the lower limit on decision errors for the air samples may be better described as the "trigger level". (Refer to General Comment #3).

Optimize the Decision for Obtaining Data: Section 3.2.7, second sentence, page 3-9. Replace the phrase "daily by the EPA" with the phrase "by the EPA as necessary".

Selecting Soil Sampling Locations: Section 4.1.1, page 4-1. The SAP provides a description of how sampling locations will be assigned. This approach seems appropriate, however it is unclear whether sampling locations have already been assigned or will be assigned in the field as excavation progresses. It is recommended that a map that identifies the grid squares, the orientation of the cross-shaped sampling pattern, and the subsample locations be prepared prior to excavation. This will relieve the field workers responsibility of randomizing the sampling patterns and will ensure that the grids are consistently identified. If possible, this map should be presented in the SAP.

This section should be refined to indicate the depth at which samples will be collected. For example, will the soil sample be collected at the horizon where the excavation ended? This section should also state that uniform subsamples will be collected. That is, an implement (such as a coring device or other suitable tool) should be used to ensure that identical masses are collected at each subsample location. This effort will help to ensure that a single subsample does not improperly influence the composite results.

Sample Identification: Section 4.1.2, fourth sentence, page 4-1. This sentence should be revised

to state that all sample IDs collected as part of the removal action should be labeled as "1R-####". The "1R" indicates that samples were collected as part of the removal action.

Collecting Soil Samples: Section 4.1.3, Section 4.0 Required Equipment, page 4-2. The following statement: "...the samples will be kept as cool as possible at all times." is ambiguous. If no ice will be used on these samples, temperature control cannot be assured. It is recommended that this statement be removed from the SAP in all sections that it appears.

Collecting Soil Samples: Section 4.1.3, last sentence, page 4-2. The term "off-site laboratory" should be clarified. That is, if this refers to the CDM Federal Programs Sample Preparation Laboratory in Denver, CO, state this.

Sample Documentation: Section 4.1.4, page 4-3. Please clarify the procedure for collecting GPS coordinates for composite samples. Will the center of the grid be read to represent the composite, or will a GPS coordinate for each subsample be obtained as well? Also, indicate how these GPS coordinates will be stored to ensure that Sample IDs (Blind IDs) can be imported into the Libby Field Database.

Sample Custody, Packaging, and Shipping: Section 4.1.5, Section 5.1 Chain-of-Custody Record, page 4-3. Please remove the phrase "or as specified by the Volpe Center".

Sample Custody, Packaging, and Shipping: Section 4.1.5, Section 5.0 Procedures, page 4-3. Please remove the last sentence.

Quality Control Samples: Section 4.1.6, page 4-4. This section states that "Soil QC samples will be analyzed at a rate of one per ten samples (i.e., 10 percent) or at the rate specified by the Volpe Center. This rate should be identified in the SAP and should be based upon the total number of samples planned. That is, if a very large number (e.g., >1000) of samples will be analyzed, then a rate of 10% may be exceedingly high. Once an estimate of total samples are known (Refer to Specific Comment # 2), then a reasonable frequency of duplicate samples can be identified.

Additionally, it is unclear how the frequency of collection of duplicate samples will be tracked. The details for tracking and maintaining the frequency of duplicate sample collection and analysis over time must be provided. These procedures should be designed so that submission of large slugs of duplicate samples are submitted at one time is avoided. Rather, a small set of duplicates should be submitted on a daily basis so that QA/QC measures may frequently assess sampling and analysis activities. [Duplicate samples must be tracked using the spreadsheet format example provided in Appendix E.]

Equipment Decontamination: Section 4.1.7, page 4-4. Will equipment decontamination (decon) procedures be assessed in any way? If so, please describe the steps for assessing decon. If not, explain why decon cannot be assessed.

Sample Identification: Section 4.2.2, second sentence, page 4-5. Replace the word “six” with “five” and adjust the example sample IDs (Blind IDs) appropriately.

Sample Custody, Documentation, Packaging, and Shipping: Section 4.2.4, page 4-5. General COC procedures should not vary significantly between soil and air samples, therefore this section should more closely resemble Section 4.1.5. The major difference between soil and air sample COC procedures is that **for samples submitted to the EMSL Mobile Lab only** air volume sampled must be provided. ISSI Consulting Group has provided a report that will provide air volumes. This report must be printed and submitted to the EMSL Mobile Lab technician along with the samples and the e-COC form. Refer to the Draft Field Database User’s Manual (July 2000). Air volumes do not have to be provided to the off-site laboratories.

New Subsection Required for Section 4.2. Include a subsection that indicates the procedures for archiving air samples both at the mobile and off-site laboratories. For example, specific procedures for when samples retained at the mobile laboratory must be transferred to the off-site laboratory must be provided.

Laboratory Analytical Methods: Section 5.0, page 5-1. This section should indicate that not every method identified in Table 2 will be analyzed for all samples. State the frequency each analytical method will be applied and refer the reader to the flow diagrams for additional information.

Sample Management Flow Diagram for Soils: Figure 2. Please refer to marked copy of flow diagram (Appendix D). Whenever possible, indicate the turn-around-time (TAT) requirements at each step where this is pertinent (Refer to example provided for Sample Management Flow Diagram for Personal Air Monitoring Sample-Appendix B).

Sample Management Flow Diagram for Air Samples: Figure 3. Readability of this figure can be improved by creating a flow diagram for each type of air sample: personal air monitoring and ambient air monitoring. Refer to the example prepared for the personal air monitoring (Appendix B).

## Appendix A

**Project Plan Review Outline  
for Removal Activities**

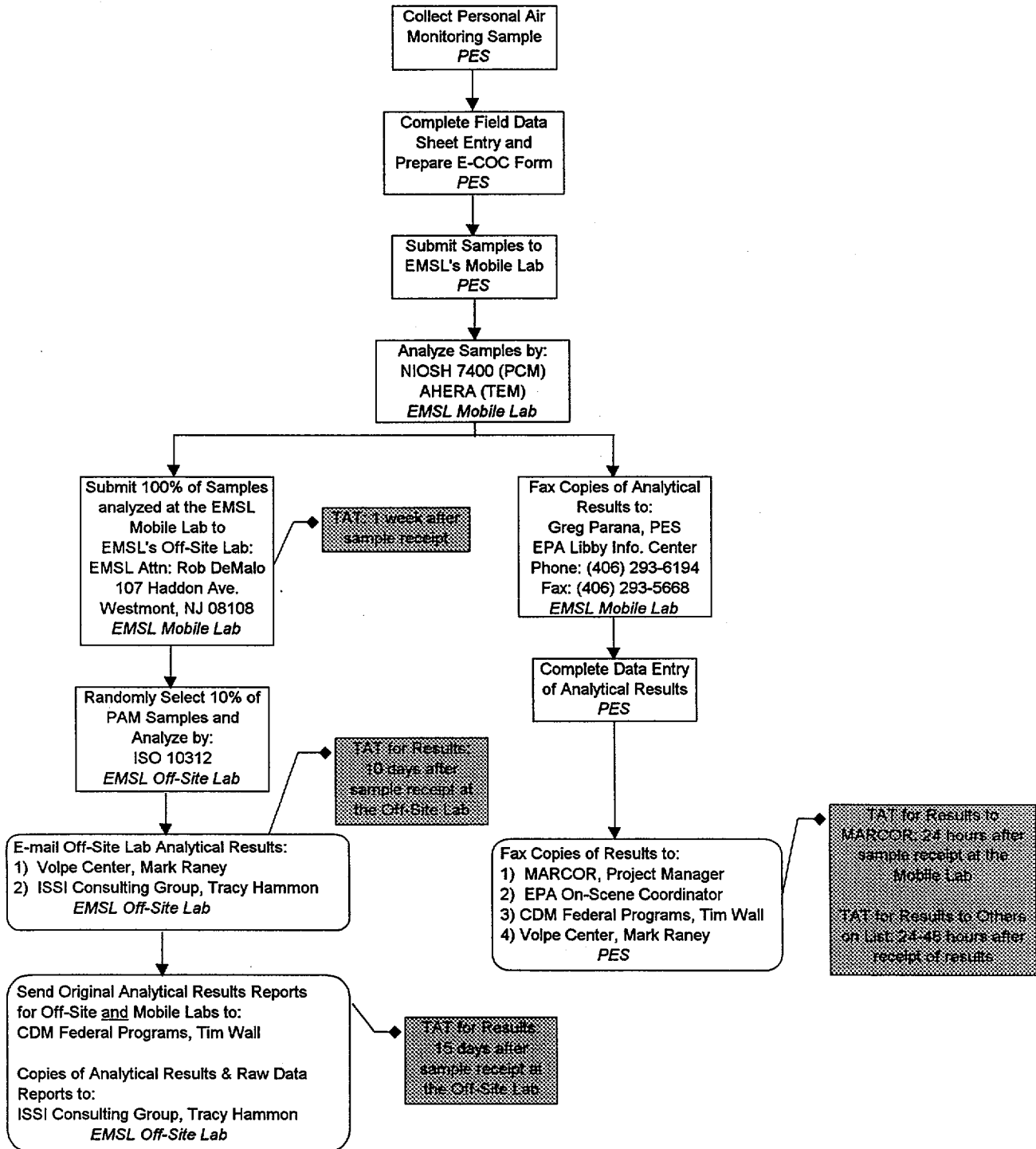
1. Data Quality Objectives (DQOs)
  - a. Are DQOs clearly presented for the planned investigation?
  - b. Is the project plan intended to support a characterization of the nature and extent of contamination, a confirmation of contamination removal, or both?
  - c. Does the project plan provide provisions for a single or phased approach for site investigation?
  - d. Would the project plan be improved either by the reduction or addition of phases?
2. Sample Media, Location and Number
  - a. What media are planned for investigation and is an adequate rationale provided?
  - b. If any media are excluded from investigation, is a rationale provided?
  - c. Does the project plan identify the sampling locations?
  - d. Is adequate rationale for placement of sample locations (investigative and background) provided?
  - e. What type of protocol (random, systematic, biased) will be used to identify the sampling locations?
  - f. Is the quantity of sampling locations adequate to meet the stated DQOs?
  - g. Is the number of samples taken at a single location also adequate?
  - h. Does the project plan explain how these numbers were derived?
3. Field Screening and Sampling
  - a. Is field screening planned?
  - b. If so, what purpose do the screening methods serve? Is this adequate for the intended data use?
  - c. Is the project plan adequate to ensure proper sample collection methods and equipment?
  - d. Does the project plan specify appropriate sample handling, custody and shipping procedures including: containerization, preservation methods, holding times, etc.)?
4. Laboratory Analysis
  - a. What chemical and/or physical characteristics will be measured?
  - b. Is this selection appropriately justified?
  - c. Should other analytes or methods be measured?
  - d. Are the analytical methods prescribed in the project plan acceptable, USEPA standard methods?
  - e. If not, are they adequate?
  - f. Are the laboratory methods and detection limits acceptable to the stated use and DQOs?

5. Quality Assurance/Quality Control

- a. Does the project plan present QA/QC objectives (QA1, QA2, or QA3) that are appropriate for the specific removal activities?
- b. Does the project plan include provisions for QA/QC in the field and are they adequate?
- c. Are there built-in checks-and-balances that will allow for audits, review and QA of the field activities and/or field data?
- d. Are there built-in checks-and-balances that will allow for audits, review and QA of the field activities and/or field data?
- e. Does the project plan include provision for the QA/QC at the analytical laboratory and are they adequate?
- f. Does the project plan outline deliverable (electronic and hardcopy) requirements?

## Appendix B

Figure XX. Sample Management Flow Diagram for Personal Air Monitoring Sample



## Appendix C

## **Example Text Inserts**

### **4.11 Instrument Calibration and Frequency (B7)**

Instrument calibration of field equipment will be performed daily (prior to initiation of analyses) in accord with procedures outlined in the respective SOPs. Calibration of the XRF will include measurement of at least 3 different levels of NIST-certified soil standards that span the range of the expected concentrations. Measurements of calibration standards must be within specifications outlined in the SOP for XRF analysis (Appendix F). Analysis of investigative samples may not begin until measurements of certified standards are within performance limits.

Laboratory instrumentation, used for sample analyses, will be calibrated in accordance with the SOPs or recommended USEPA methodologies. Calibrations must be acceptable before any measurements on investigative samples may be made. Traceable calibration standards will be obtained by the analytical laboratories. All documentation relating to receipt, preparation and use of standards will be recorded in the appropriate laboratory logbooks. This information will be forwarded as part of the raw analytical data package as described in Section 4.6.2.

### **4.12 Assessment and Oversight (C)**

The following sections describe activities for assessing the effectiveness of the implementation of the project and associated QA/QC. The purpose of the assessment is to ensure that the project plan is implemented as prescribed. The elements include assessments and response actions and reports to management as described in the following sections.

#### **4.12.1 Assessment and Response Actions (C1)**

##### **4.12.1.1 Audits (C1)**

Assessment of field activities and laboratory analyses will be conducted through oversight of analytical procedures through field and laboratory audits. The purpose of the oversight (audit) activities will be to document field sampling and analysis procedures, to determine if activities are proceeding in accord with project requirements and to document any changes, additions or deletions that have occurred during field sampling and analysis and to identify and immediately implement any corrective actions.

Field audits will evaluate field procedures to ensure that activities are proceeding in accord with the project plan. If conflicts are noted, these must be addressed so that project requirements are met.

Laboratory audits will evaluate laboratory procedures to ensure that they follow Good Laboratory Practices (GLP) Guidelines and to ensure that they do not conflict with project requirements. If conflicts are noted, these must be addressed so that project requirements are met. Additionally,

laboratory analyses may also be assessed through submittal of performance evaluation (PE) samples. PE samples may be used as a tool for evaluating the accuracy of laboratory analyses. PE samples are standards submitted blind to the laboratory and are typically submitted prior to submittal of investigative samples. The concentration is unknown to the laboratory analyzing the sample, but known to the submitter. The laboratory reported results for the PE samples will be evaluated by comparison to the certified values provided by the contractor providing field and laboratory oversight (ISSI).

Other audits that will be carried out over the course of the project include:

- Review and verification of procedures followed as part of real-time control charting of QC samples analyzed via field and contract laboratory procedures
- Evaluate the flow of electronic data
- Review and verification of hardcopy data

Audits will review the data flow, verify data entry procedures and evaluate whether data management QC protocols are being observed. If audits resulting from review of any of the procedures reveal that project requirements are not met, then corrective action for the deviation must be requested, reviewed and reported. Results for all audits must be documented and submitted to the USEPA Remedial Project Manager. Information in the report includes:

- Type of System Audit (Field, Laboratory, Data Management, etc.)
- Date of audit
- Summary of procedures reviewed
- Results of the review/audit including any non-conformances noted
- Corrective Action Request(s) [CAR], if non-conformance noted
- Date by which CAR must be received with response

If a CAR is required, a follow-up audit must be performed within 5 working days upon receipt of the CAR to ensure that corrective actions were implemented. A Follow-up audit report describing the new findings must be submitted to the USEPA RPM. More detailed information regarding corrective action procedures is provided in the next section.

#### **4.12.1.2 Corrective Action Procedures (C1)**

Two types of corrective actions may result from audits and/or oversight: immediate and long-term. Immediate corrective actions include correcting deficiencies or errors or correcting inadequate procedures. Long-term corrective actions are designed to eliminate the sources of deficiencies or errors. If either type of corrective action is deemed necessary following an audit, each step in the following procedures must be documented:

- Identify the deviation
- Request a corrective action
- Report the problem to the USEPA RPM
- Review the corrective action response
- Perform a follow-up audit to ensure the deviation is not recurring

Appropriate corrective action procedures for specific laboratory or field quality control samples are outlined in the subsequent paragraphs. Refer to Table 4-2 for recommended corrective action.

## Appendix D

Please refer to Appendix E for general format desired.

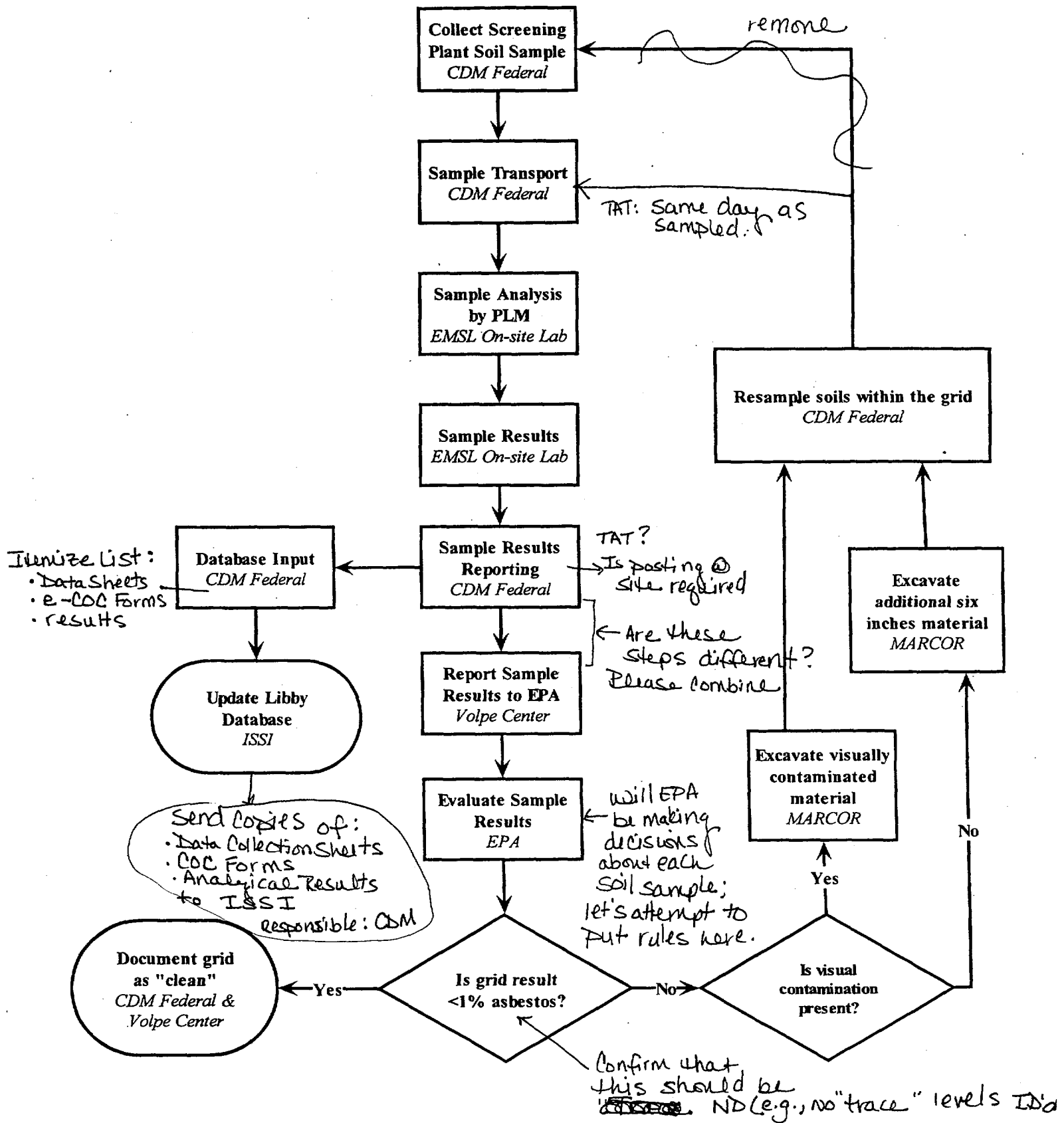


Figure 2. Sample Management Flow Diagram for Soils

## Appendix E

## 44

- <sup>a</sup> - Enter date in the following format: mm/dd/yy; enter time as 24-hour time (e.g., 1340)
- <sup>b</sup> - At least 2 mass measurements will be recorded. The sample is completely dry if the mass measurement is stable.
- <sup>c</sup> - Use a wire-mesh sieve with 1 cm (3/8") openings.
- <sup>d</sup> - Sample mass prior to sieving.

## Sample Preparation Logbook Sheet

[illegible]

<sup>a</sup> - Enter date in the following format: mm/dd/yy; enter <sup>b</sup> - Enter date in the following format: mm/dd/yy; enter time as 24-hour time (e.g., 1340)

<sup>b</sup> - At least 2 mass measurements will be recorded. The sample is completely dry if the mass measurement is stable.

<sup>c</sup>-Use a wire-mesh sieve with 1 cm (3/8") openings. <sup>c</sup>-Use a wire-mesh sieve with 1 cm (3/8") openings.

<sup>d</sup> - Sample mass prior to sieving.

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